South Coast AQMD Update - Natural Gas Vehicle Program

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SCAQMD Fleet Vehicle Rules

- 1191 - Light- and Medium-Duty Public Fleets
- 1192 -Transit Buses
- 1193 - Refuse Collection Vehicles
- 1194 - Commercial Airport Ground Access
- 1195 - School Buses
- 1196 - Heavy-Duty Public Fleet Vehicles
- 1186.1 - Less-Polluting Sweepers









Over 14 Years of Implementation

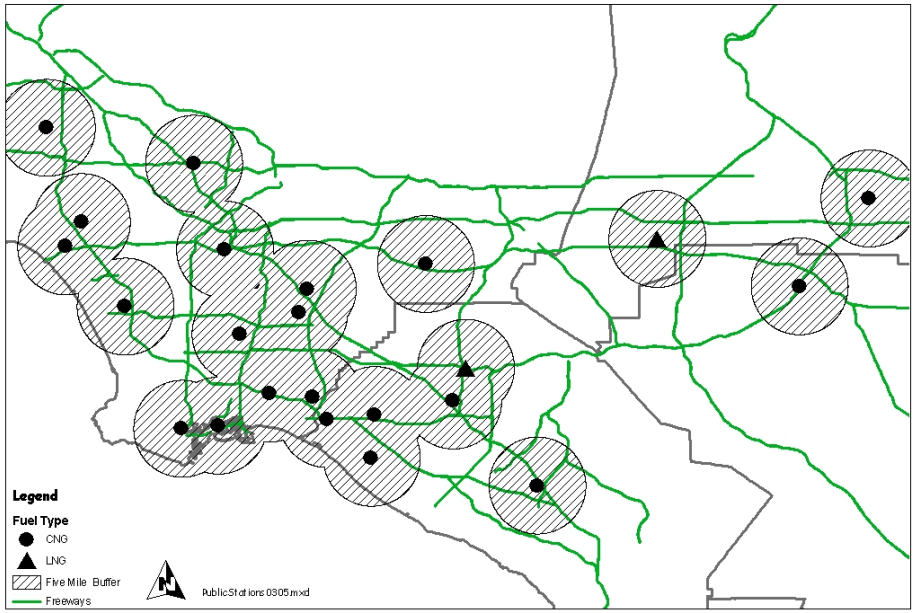
- Acceptance By Majority of Fleets on the Use of Alternative Fuel Vehicles
- Recognition that Alternative Fuels May Not be Applicable in Specific Vocations
- Private Sector Fleets are Benefiting from the Use of Alternative Fuel Vehicles

Natural Gas Vehicles Operating in the AQMD

Year 2004		Year 2014
~ 3,430 Light- and Medium-Duty Public Fleet Vehicles		~ 3,710 Light- and Medium-Duty Public Fleet Vehicles
~ 2,830 Transit Buses	 	~ 4,540 Transit Buses
~ 943 Refuse Trucks		~ 2,060 Refuse Trucks
~ 320 School Buses		~ 2,000 School Buses
~ 665 Heavy-Duty Public Fleet Vehicles	  	~ 690 Heavy-Duty Public Fleet Vehicles
~ 151 Street Sweepers		~ 340 Street Sweepers
~ 500 Taxicabs and Airport Shuttles	 	~ 860 Taxicabs and Airport Shuttles

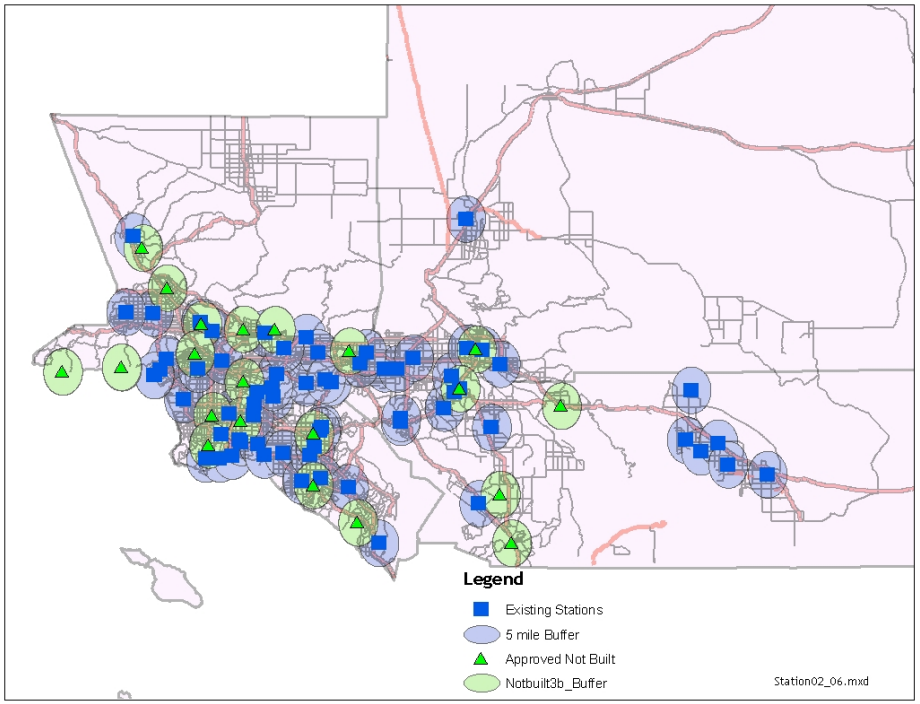
South Coast AQMD CNG/LNG Stations

Year 2000



23 Stations Existing

Year 2014



~109 CNG, 19 LNG Public Access Stations

~106 CNG, 16 LNG Private Stations

In-Use Emissions Measurement Study

In-Use Emissions Measurement Study Objectives

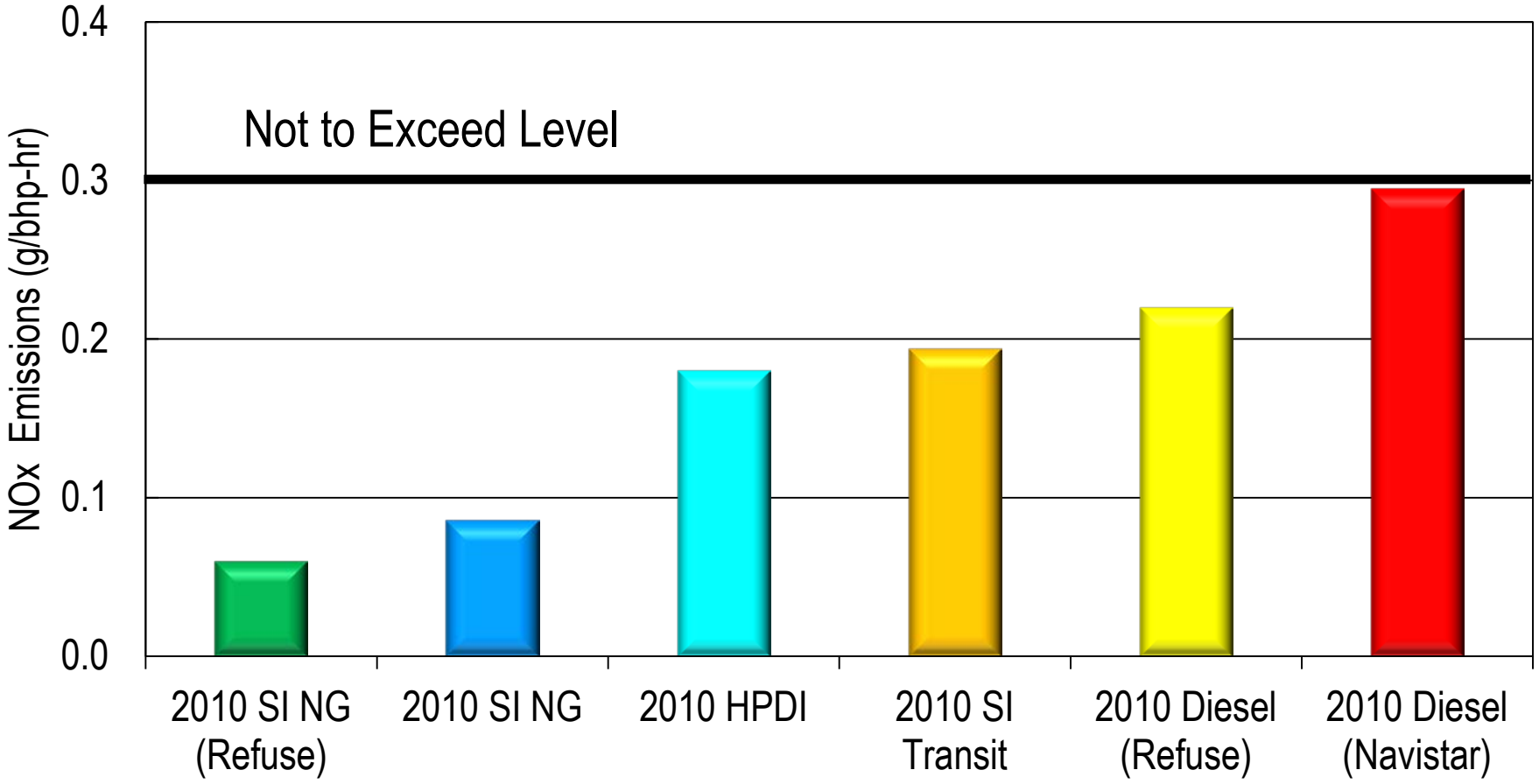
- Determine If In-Use Emissions are within Certification Standards
- Quantify Ammonia Emissions from Natural Gas Engines
- Evaluate Retrofit Device(s) for Use On Heavy-Duty Vehicles if Needed
- Greenhouse Gas Emissions

Key Findings

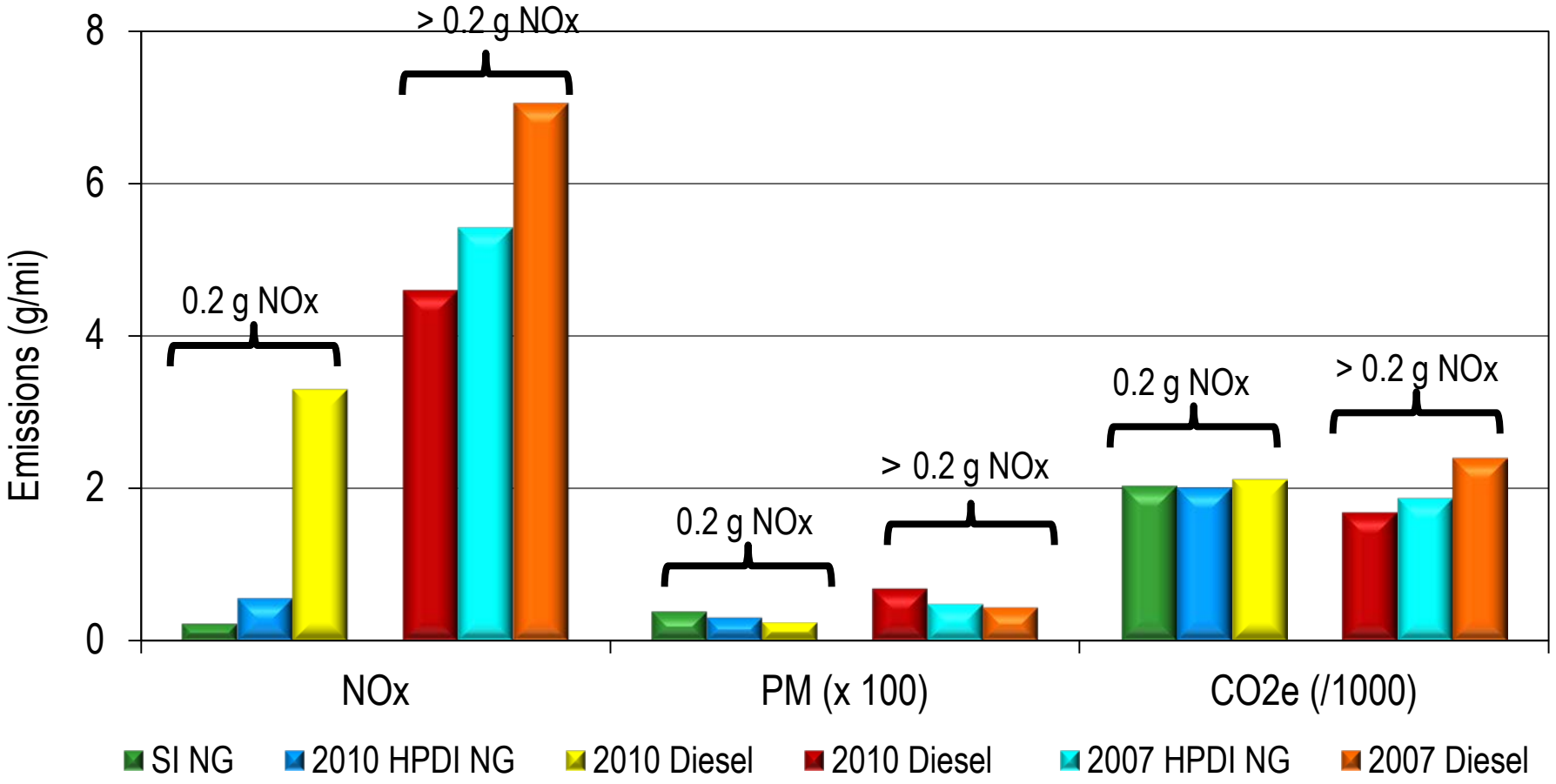
- In-Use NOx Emissions Compared to 2010 Exhaust Emission Standard Are Within Certification Standards
- Diesel NOx Emissions Highly Dependent on SCR Performance
- CO2 Dominates GHG Emissions
- Ammonia Emissions from Natural Gas Engines

Preliminary Key Findings

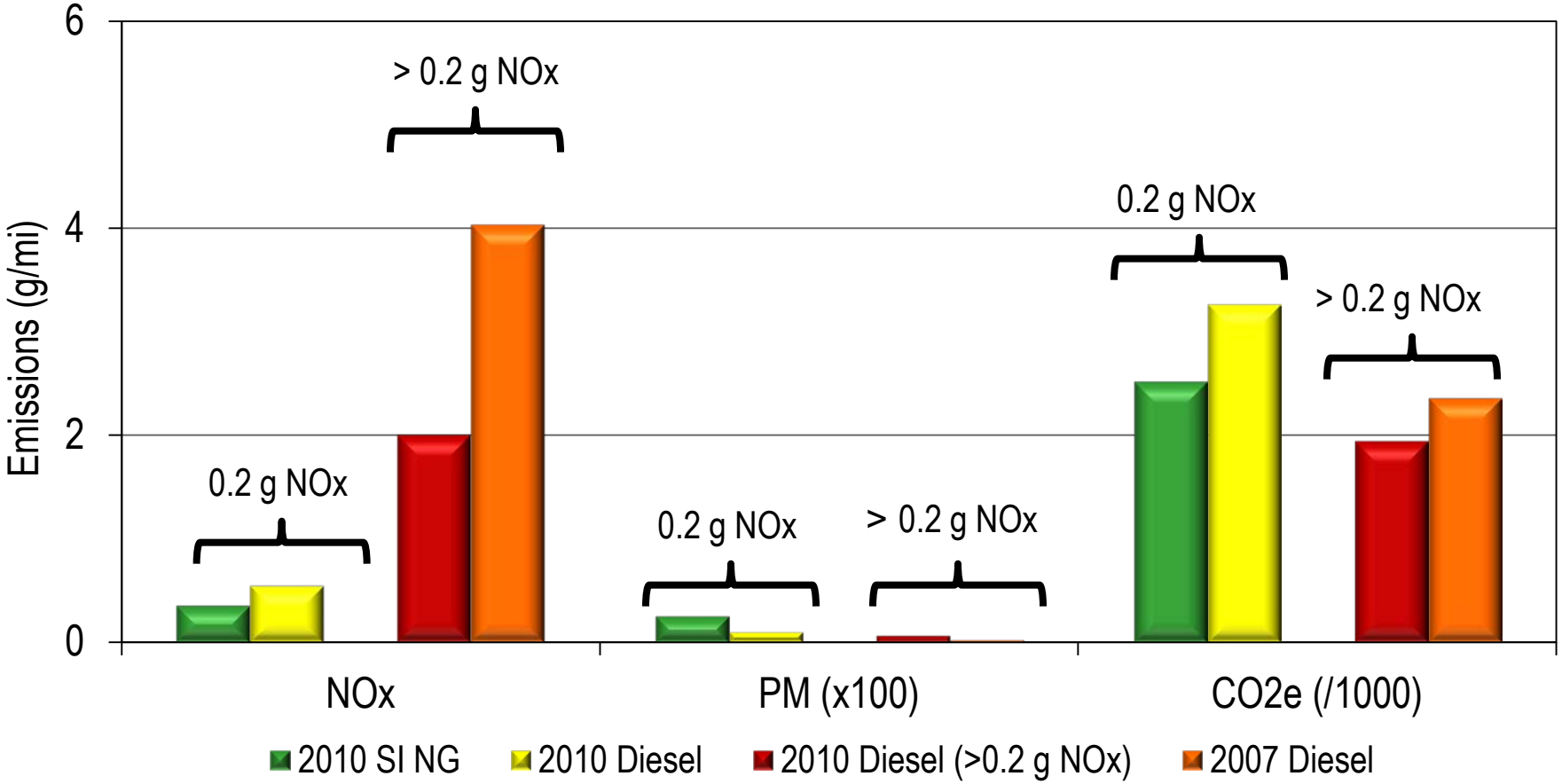
In-Use NOx Emissions Compared to 2010 Exhaust Emission Standard Are Within Certification Standards



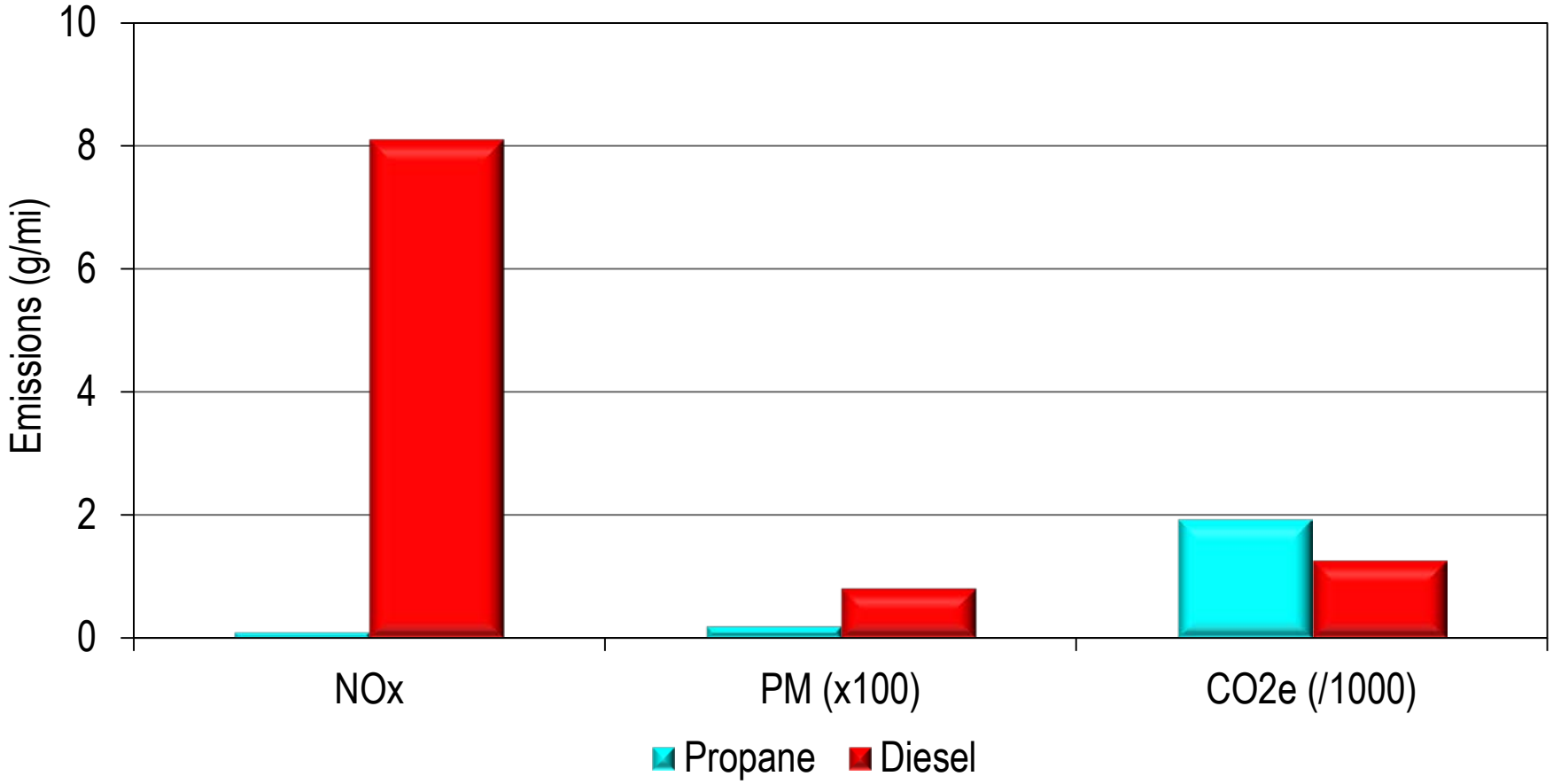
Overall Measurements



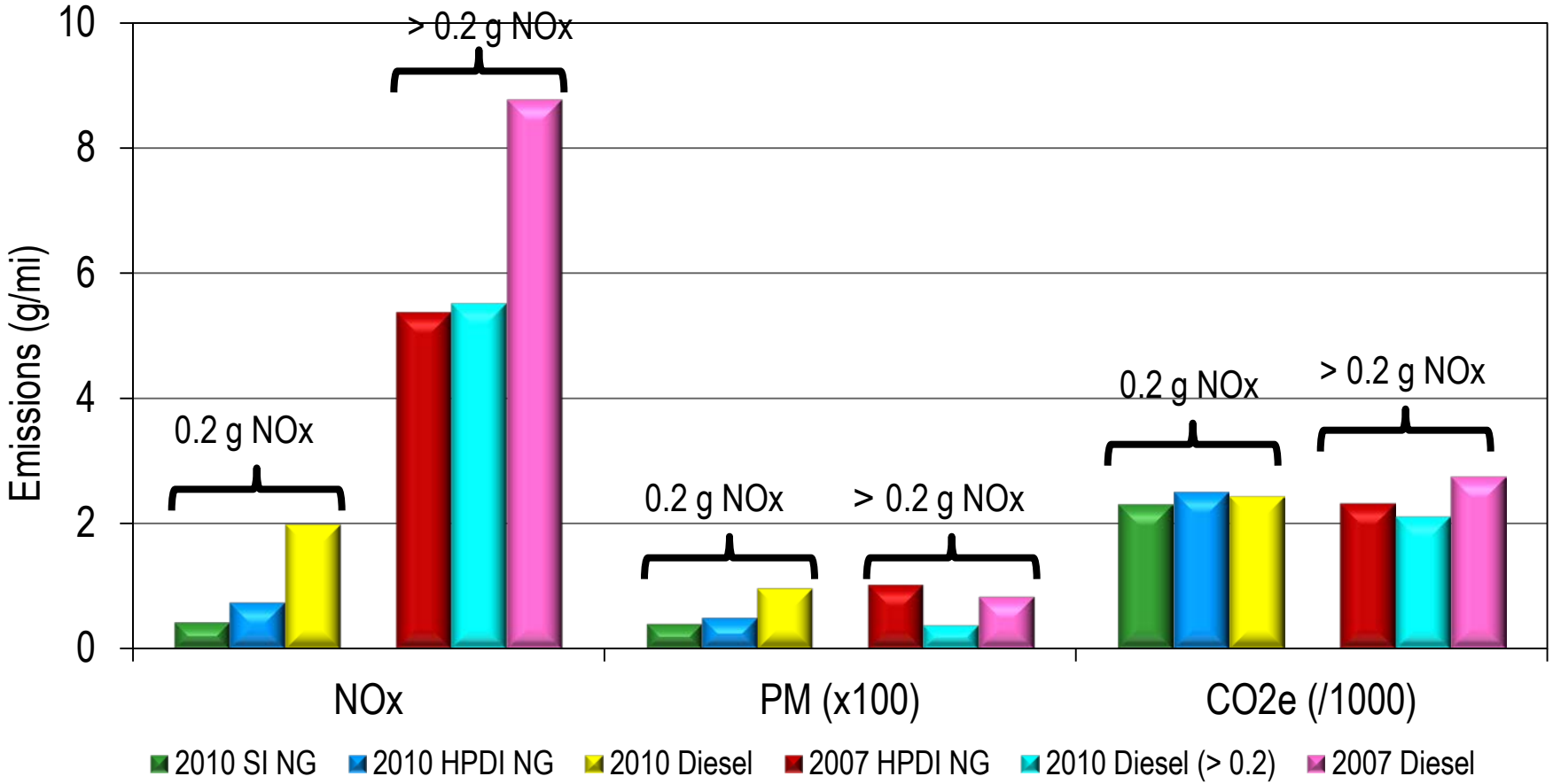
Refuse Truck In-Use Emissions



School Bus In-Use Emissions

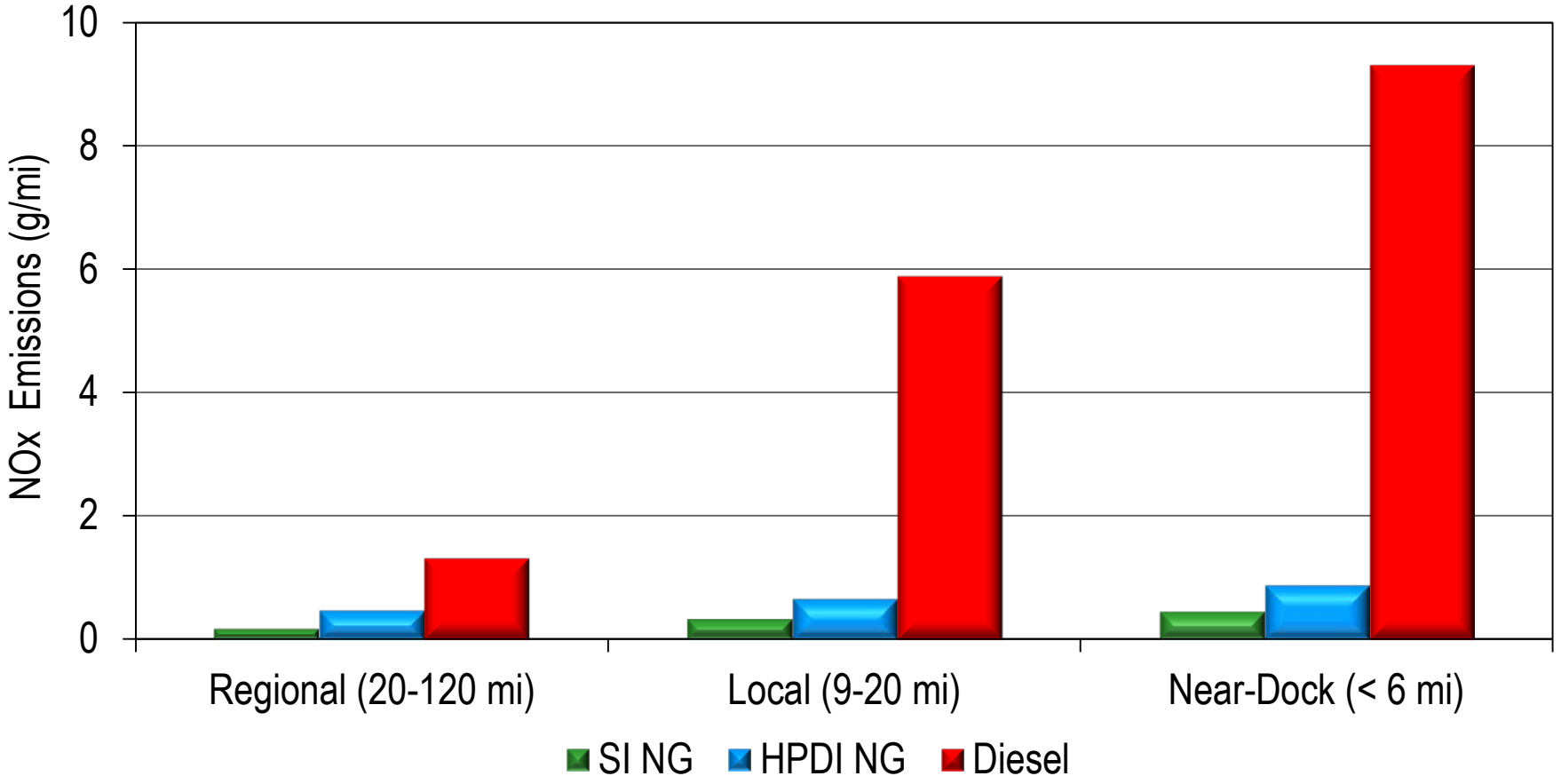


Drayage Truck In-Use Emissions



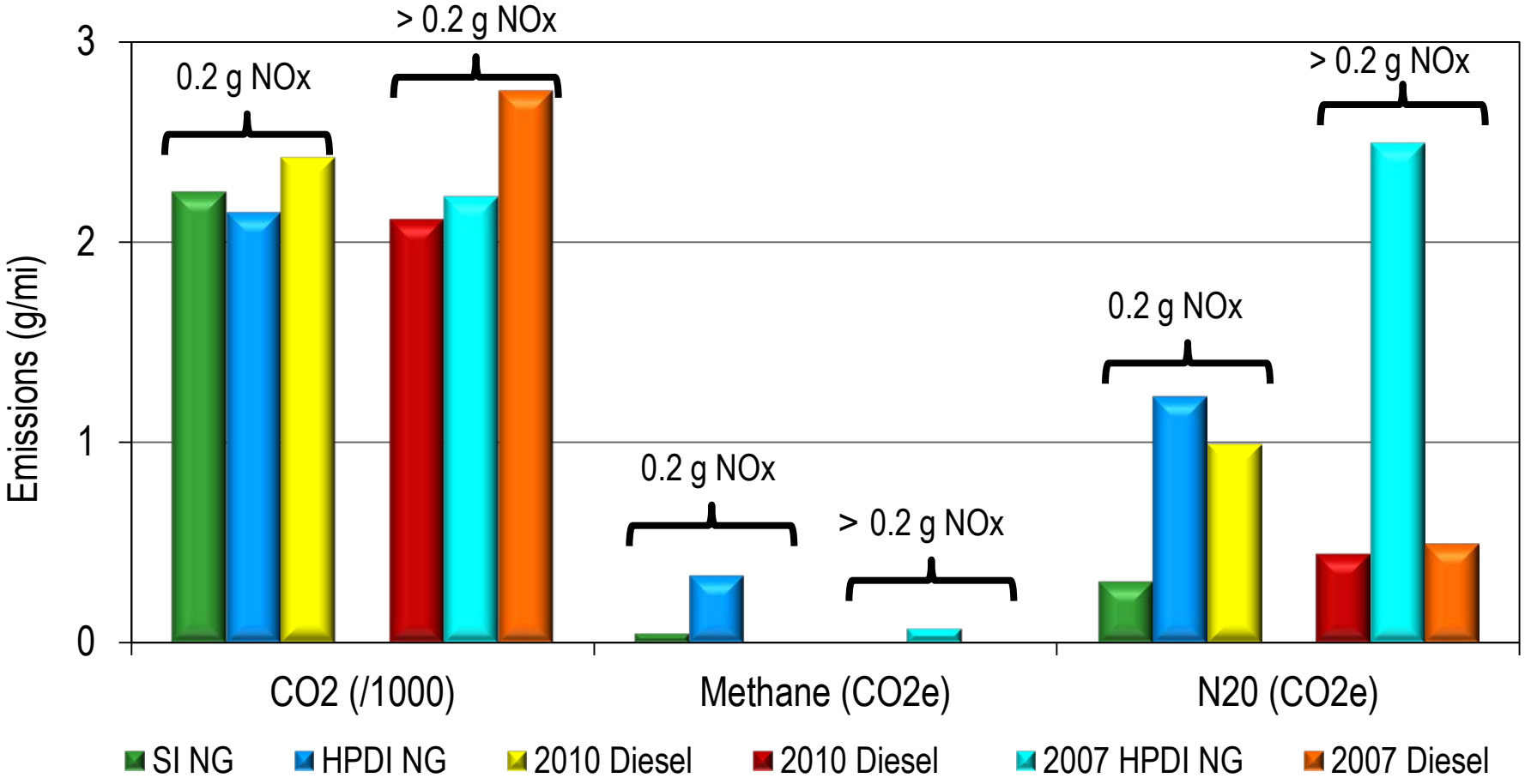
Preliminary Key Findings

Diesel NOx Emissions Highly Dependent on SCR Performance



Preliminary Key Findings

CO2 Dominates GHG Emissions



Ammonia Emissions from Natural Gas Engines

- Measurements
  - Spark Ignited Natural Gas Engines - ~1.2 g/mi
  - HPDI Natural gas Engines - ~0.2 g/mi
  - Diesel Engines – Not Significant
- Implications on PM2.5 Air Quality
  - Ammonia Emissions from Passenger Cars Much Larger Contributor to Total Ammonia Compared to Heavy-Duty Vehicles
  - Evaluation as part of 2016 AQMP
- Governing Board Award
  - WVU to Develop and Optimize NOx and Ammonia Retrofit technology for Natural Gas Heavy-Duty Vehicle

South Coast AQMD Programs

- Carl Moyer Program for Heavy-Duty Vehicles
- Lower Emission School Bus Replacement Program
- Air Quality Investment Programs
- Enforcement-Compliance Settlement/Penalty Fees
- Regulatory Incentives Programs for On-Road and Off-Road Mobile Sources
- Proposition 1B/AB 118 Funding

Source: Port of Los Angeles

Next Generation Natural Gas Engine Development

- Working Definition of "Near-Zero" – 0.02 g/bhp-hr or Cleaner
  - On-Going with CEC, SoCalGas – 0.02 g Heavy-Duty Engines (9L and 15L)
  - GTI, SoCalGas – 0.02 g Engine for Class 4 – 7 Vehicles

Unique Markets

- CNG Parking Lot Street Sweepers – Currently Being Demonstrated in Orange County
- CNG Police Interceptor –

  $65,000 (Two-Year Demonstration)
- New CNG Police Interceptor Development – Open Solicitation
- Vehicle DNA – Matching Vocations with Duty-Cycle




On-Going and Future Activities

- Continue Partnership with U.S. DOE, CEC, Stakeholders on Natural Gas Vehicle Technologies
- Co-Fund Opportunities to Combine Natural Gas Engines with Hybrid Systems
- Increase Renewable Fuel Portfolio
- Evaluating Future Needs and Requests from Various Operators/Fuel Providers for Improved Performance from Natural Gas Vehicles and Refueling Stations